

**Safety....The NASA Family....Excellence....Integrity**

# **NASA Safety and Mission Assurance Audit Program**

## **Compliance Verification Workshop**

**September 14- 16, 2004**

**Presented by: Dr. J. Steven Newman**

Office of Safety and Mission Assurance  
Review and Assessment Division

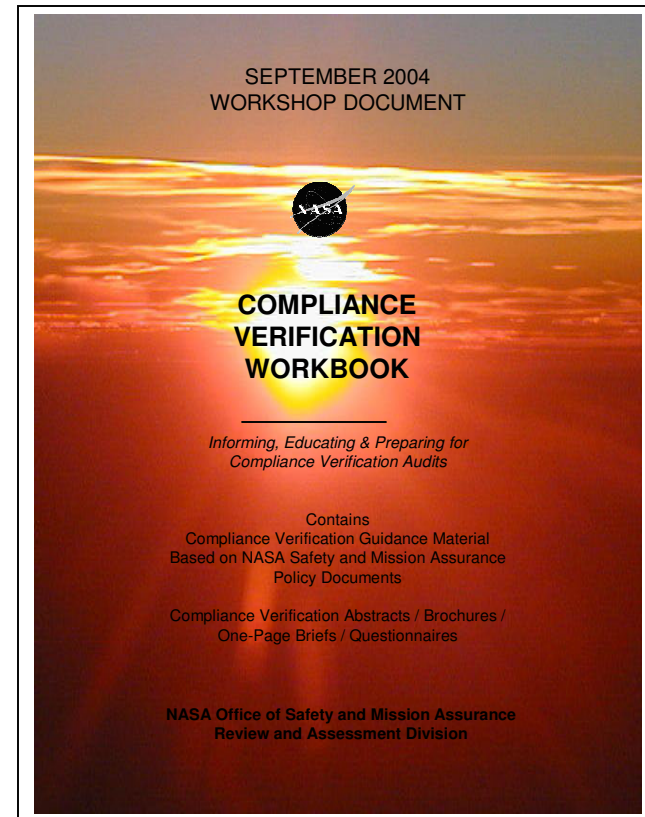


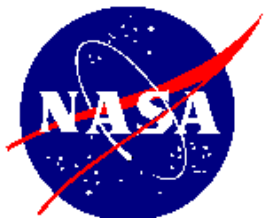
**Safety....The NASA Family....Excellence....Integrity**

## **Workshop Purpose**

**To hold a working session to review and help build a robust Agency Safety & Mission Assurance Compliance Verification Program.**

- Review of Compliance Verification (CV) Audit Processes**
- Review of Compliance Verification Guidance (CVG) Material**





## Safety....The NASA Family....Excellence....Integrity

# 51 SMA Requirement Documents Identified

### Group I: OVERARCHING SMA PHILOSOPHY & POLICY (3)

Foundation Documents

P/I

Top SMA Doc, NPD 8700.1B  
Risk Management, NPR 8000.4  
Safety Manual NPR 8715.3  
Annual Operating Agreements - Center specific SMA "management contracts" (*Not included in the total of 51 auditable SMA Req'ts*)

### Group II: INSTITUTIONAL /OPERATIONAL SAFETY (IOS) GROUP (10)

Safety Implementation

I

OSHA HB, NPR 8715.1  
Safety, NPD 8710.2D  
Facility Safety, NASA-STD-8719.7  
Pressure Vessels, NPD 8710.5B  
Pressure Vessels, NPR 8715.4  
Underwater Facility Safety, NASA-STD-1740.10  
Lifting Devices, NASA-STD-8719.9  
Fire Protection, NASA-STD-8719.11  
Facility Operations Readiness Review, NASA-STD-8719.1  
Aviation Safety, NPR 7900.3A (*Code O=OPR*)

### Group III (A): PROGRAM IMPLEMENTATION (23)

Designing / Building / Testing / Operating / Retiring

P/I

Reliability, NPD 8720.1B	QA Placeholder Doc
New PRA Doc, NPR 8705.5	Parts, NPD 8730.2B
Rel. Plng for Pgms, NASA-STD-8729.1	Parts/GIDEP, NPR 8735.1A
	Calibration, NPD 8730.1B
Orbital Debris, NPD 8710.3B	Supl. Audit/Surv, NPR 8735.2
Range Safety, NPR 8715.X	NASA-STD-8739.4 Wire Crimp & Cable
	NASA-STD-8739.5 Fiber Optics
S/W IV&V Directive NPD 8730.4A	NASA-STD-8739.3 Soldering
S/W Assurance Standard, NASA-STD-8739.8	NASA-STD-8739.2 Surface Mont
S/W Formal Insp.Std, NASA-STD-2202-93	NASA-STD-8739.1 Conformal Coating
S/W Safety Std, NASA-STD- 8719.13B	Hydrogen, NASA-STD-1740.16
S/W Doc Req, NASA-STD- 2100-91	Explosive, NASA-STD-1740.12
S/W Eng Requirements, NPR 7150	

### Group III (B): Program Specific Implementation of SMA Requirements

Critical to Flow-down of SMA Baseline Req'ts (*Not included in the total of 51 auditable SMA Req'ts*)

Pgm & Prj Mgmt, NPD 7120.4 and NPR 7120.5C

•PCA

•Program Plan

•Project Plan

•Project SMA Plan

•Level 0/1 Requirements

SMA Implementation within Contract / MOUs / Grants (e.g. Systems

Effectiveness Plan or equivalent)

{NASA FAR Supplement Requirements and Risk Based

Acquisition Mgmt (RBAM) Implementation}

Chief Engineer = OPR

### Group IV: PROGRAM CLASS - REQUIREMENTS DOCUMENTS (10)

Unique To Specific Programs

P

Inst / Launch Serv, NPD 8700.3A	Experimental Aerospace Vehicles SMA
Payload Class, NPR 8705.4	Policy NPD 8700.2A
	Experimental Aerospace Vehicles SMA
Human Rating, NPR 8705.2	Requirements NPR 8705.3

ELV SMA R&R, NASA-STD-8709.2

ELV/Payload Safety Review, NASA-STD-8719.8

ELV Oversight, NPD 8610.23A (*Code M=OPR*)

ELV Review, NPD 8610.24A(*Code M=OPR*)

ELV Risk Mitigation, NPD 8610.7A (*Code M=OPR*)

### Group V: CONTINGENCY / RECOVERY / INVESTIGATION (5) I

Preparing For & Responding To Incidents

Continuity of Operations, NPD 1040.4A

Continuity of Operations, NPR 1040.1

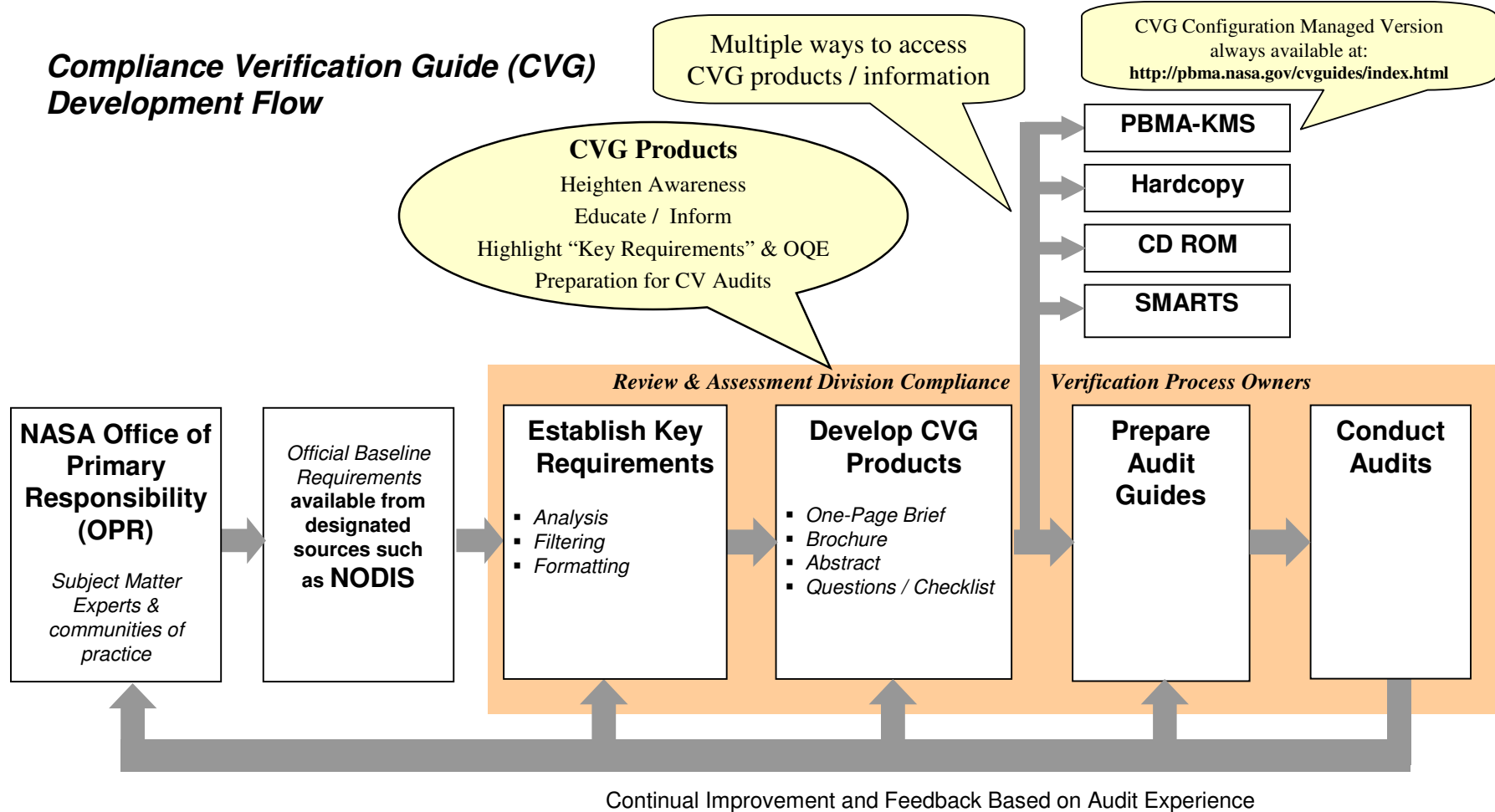
Emergency Preparedness, NPD 8710.1B

Emergency Preparedness, NPR 8715.2

Mishap Investigation, NPR 8621.1A



## Compliance Verification Guidance (CVG) Material





## CVG Key Requirement Definition



**Defining key Agency Safety and Mission Assurance Requirements: A necessary precondition for Compliance Verification**

### Key Requirements

- Are “no-kidding, serious as a heart attack, got to do it” top level requirements
- Have clearly defined responsible party performing
- Have very specific action resulting in clearly identifiable result or outcome with
- Have clearly identifiable objective quality evidence (OQE)

### Key Requirements are not ...

- Third order derived requirements
- Organizational roles and responsibilities
- A desired state of being
- Support or coordination roles



Safety....The NASA Family....Excellence....Integrity

## Compliance Verification (CV) Challenges

***“You never finish auditing – you just have to stop.”***

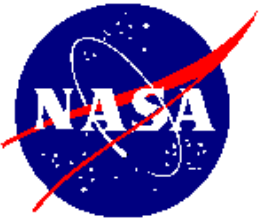
**Al Ford Jr. PE, Deputy Director, Submarine Safety & Quality Assurance**

### **GIVEN:**

- Responsibility to verify compliance
- Over 50 Agency safety & mission assurance documents
  - Thousands of individual “requirements”
- Limited Time / Limited Resources
- Pressures to move forward with facility / program activity

### **RESULT:**

- HQ Independent Audit can develop visibility into compliance status by examining compliance with key requirements
- Center-based SMA audit is responsible to verify compliance with the full requirement set as contained within official requirements libraries, such as NODIS

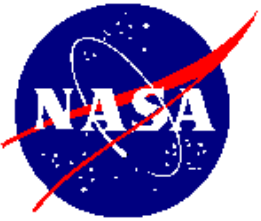


**Safety....The NASA Family....Excellence....Integrity**

## **Internal OSMA Coordination on CVG Material**

---

- **CVG materials contained in CV Workbook are advanced draft products**
- **Six month Review & Assessment Division project team effort**
- **One-on-one discussions with individual document subject matter experts over seven week period**
  - **Comment / discussion “Data packages” developed for each product set**
- **Final CVG products will address outstanding OSMA comments, CV Workshop Input, as well as input from individuals unable to attend the conference**



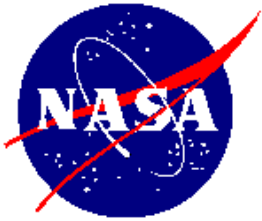
**Safety....The NASA Family....Excellence....Integrity**

## **Compliance Verification Guidance (CVG) Material**

---

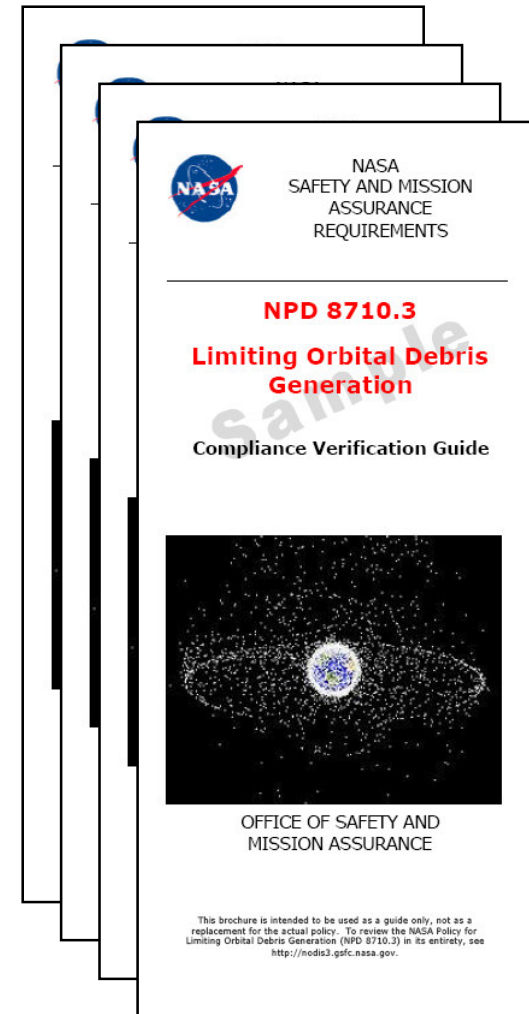
- **Presented in several formats:**
  - **Brochure**
  - **One-Page Brief**
  - **Questionnaire**
  - **Compliance Verification Abstract**
- **Audit Guides to be developed at a later date**





## Brochures

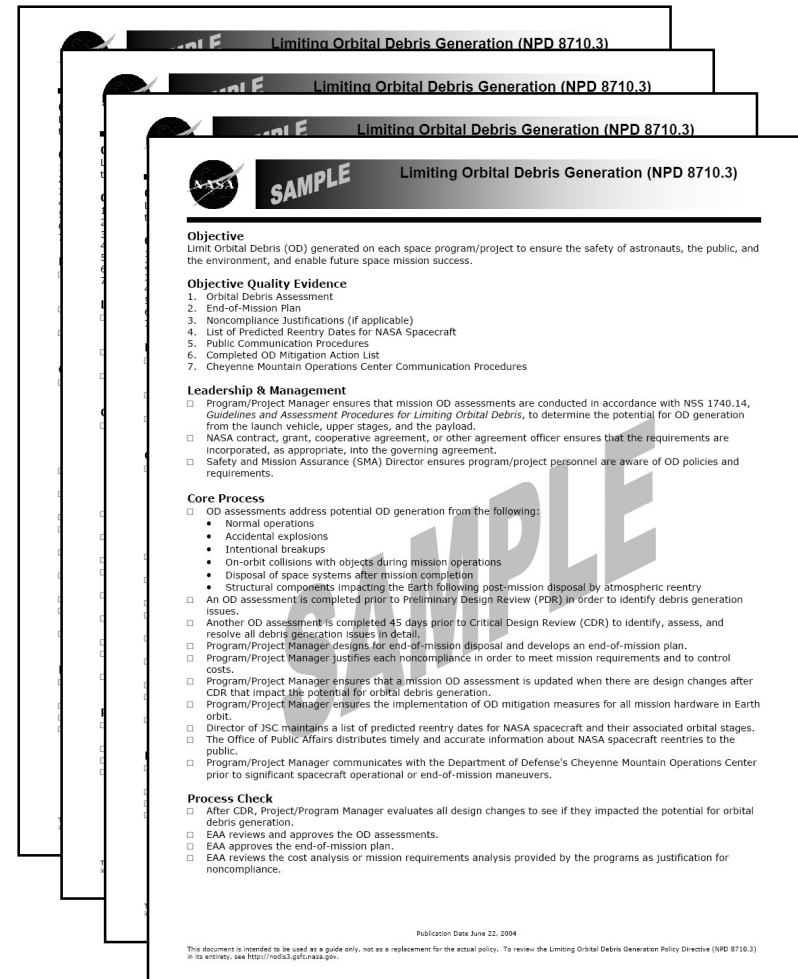
- Intended to help prepare the reader for an audit.
  - Provides an understanding of key SMA audit requirements related to a particular subject.
  - Provides pertinent information to highlight the importance of the requirements.
  - Provides further detail of the requirements.

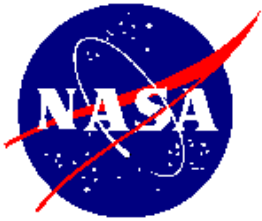




## One-Page Briefs

- Serves as an introduction to the complete requirements document as contained in the official document library.
- Groups the key SMA audit requirements by:
  - Leadership and Management
  - Core Process Requirements
  - Checking / Verification Requirements (including reviews and assessments)
- Flip-side contains role and responsibility matrix





## Compliance Verification Abstracts

- Defines the key Agency SMA audit requirements
- Lists examples of Objective Quality Evidence (OQE) for each
- Identifies implementation responsibilities in three areas:
  - Program Management
  - Center Management
  - HQ Functional Management
- Provides context for the key Agency SMA audit requirements

Limiting Orbital Debris Generation (NPD 8710.3)

OBJECTIVE	PRODUCTS
Limit orbital debris (OD) generated on each space program/project to ensure the safety of astronauts, the public, and the environment.	Orbital Debris Assessment End-of-Mission Plan

---

CONTACT INFORMATION	Notes
Office of Primary Responsibility (OPR) – Code QS OPR Point of Contact – Wayne Frazier	<ul style="list-style-type: none"><li>– Compliance to all requirements listed in the NPD is mandatory and all requirements are subject to verification.</li><li>– This abstract of the process does not include all requirements. For a listing of all requirements please review the NPD and related references.</li><li>– This abstract highlights the requirements that are the agency-level's focus of the current audit program (boldface type).</li><li>– Type of requirement - P = Programmatic, I = Institutional, F = Functional.</li></ul>

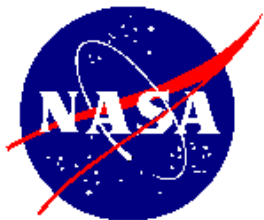
---

**REFERENCES**

- Section 203(c)(1) of the National Aeronautics and Space Act of 1958, as amended, (42 U.S.C. 2473(c)(1))
- 14 CFR Subparts 1216.1 and 1216.3
- PDC-NSC-49/INSTC-8, National Space Policy, September 14, 1996
- NPD 8710.3, Notification of Intent to Terminate Operating Space Systems
- "U.S. Government Orbital Debris Mitigation Standard Practices," December 2000
- NSS 1740.14, Guidelines and Assessment Procedures for Limiting Orbital Debris
- "Technical Report on Space Debris," of the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space, A/AC.105/720, 1999
- JSC-27862, Postmission Disposal of Upper Stages, December 1998

Publication Date June 23, 2004

**DRAFT**



## Questionnaires

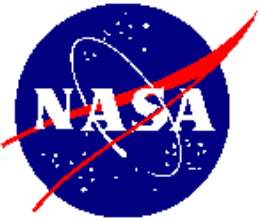
- Provides an introductory set of questions for auditors to employ in conducting audits.
- Companion document to CV-Abstract

Top Ten Audit Questions for Limiting Orbital Debris Generation (NPD 8710.3)

Item	Question	OQE?	Comments
1	Did your program perform, or are you planning to perform, an Orbital Debris (OD) Assessment prior to the Preliminary Design Review (PDR)? And 45 days prior to the Critical Design Review (CDR)?		
2	Did you receive support from resources at Johnson Space Center (JSC) and Kennedy Space Center (KSC) for your OD Assessment?		
3	Where has the Enterprise Associate Administrator (EAA) shown approval of your OD Assessment?		
4	How have you included in your design an end-of-mission plan?		
5	Where is your process for notification prior to any significant space craft operational or end-of-mission maneuvers?		
6	How have you ensured program/project personnel are aware of and understand OD policies and standards?		
7	Who in NASA tracks all orbital debris and maintains a list of reentry dates?		
8	How have you ensured that each OD assessment addresses all of the correct areas of concern?		
9	Did your program use the process for justifying noncompliance?		
10	What approvals are required for all non-compliances?		

Additional Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

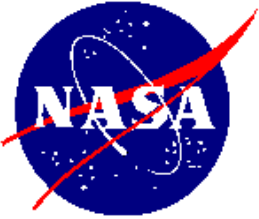
Publication Date June 25, 2004



## **Workshop Participants CVG Action Request**

---

- **Have we identified the complete set of governing Agency safety & mission assurance documents?**
- **For each CV abstract have we successfully identified the “key requirements”**
  - **For each “key requirement” have we identified the appropriate objective quality evidence (OQE)?**
- **Do the CVG Brochures convey the intent of each document and contain appropriate application references and examples?**
- **Can you add or suggest questions and/or checklist items to enhance the Audit checklists and/or questionnaires?**

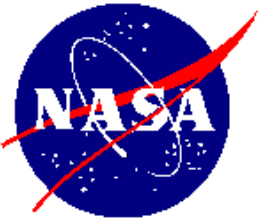


Safety....The NASA Family....Excellence....Integrity

---

# **REVIEW & ASSESSMENT DIVISION**

## **TOP LEVEL AUDIT PROCESS APPROACH**



**Safety....The NASA Family....Excellence....Integrity**

## **Review & Assessment Division Audit Process Development**

---

- **Programmatic Audit and Review Process**

- **Lead: Mr. Stephen Wander**
- **Requirement Document Groups I, III, and IV**

**Group I – Over-arching SMA Philosophy and Policies**

**Group III – Program Implementation**

**Group IV – Program Class**

- **Institutional / Facility / Operational Safety Audit Process**

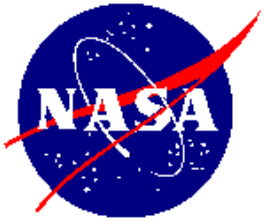
- **Lead: Mr. Art Lee**
- **Requirement Document Groups I, II, III and V**

**Group I – Over-arching SMA Philosophy and Policies**

**Group II – Institutional / Operational Safety**

**Group III – Program Implementation**

**Group V – Contingency / Recovery / Investigation**



## **Audit Process Philosophy**

---

- **Establish Clear, Concise, Executable, Measurable, Verifiable Requirements.**
- **Carefully Scoped Audits With Regard to Documents and Requirements Within Documents**
- **Achieve Maximum Synergy With Other Audit Activities**
- **Selectively employ a “time-flexible” audit approach to enable observation of critical assurance activities.**

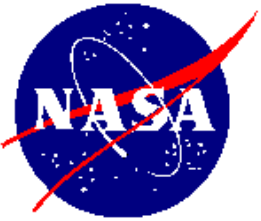
**Conduct  
“White-Hat,” or  
Good Guy  
Technical  
Assistance  
Audits**



**Conduct  
“Black-Hat”  
(No-fooling)  
Compliance  
Verification  
Audits**



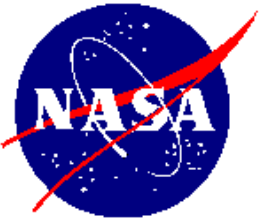




## **Audit Process Philosophy**

---

- **Verify flow-down of requirements**
- **Verify procedures and processes are in place to implement the requirements**
  - **Verify processes are stable, capable, and controlled**
- **Verify compliance through examination of OQE and in-process audits**

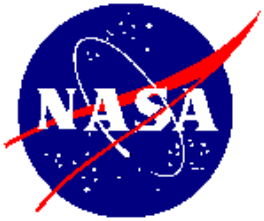


**Safety....The NASA Family....Excellence....Integrity**

## **Workshop Participants CVG Action Request**

---

- **Critically examine and discuss proposed audit approaches during afternoon discussions with process owners**
- **Recommend implementation detail**
  - **Recognizing that flexibility is key - What do you consider most critical audit scoping and customization considerations?**



**Safety....The NASA Family....Excellence....Integrity**

---

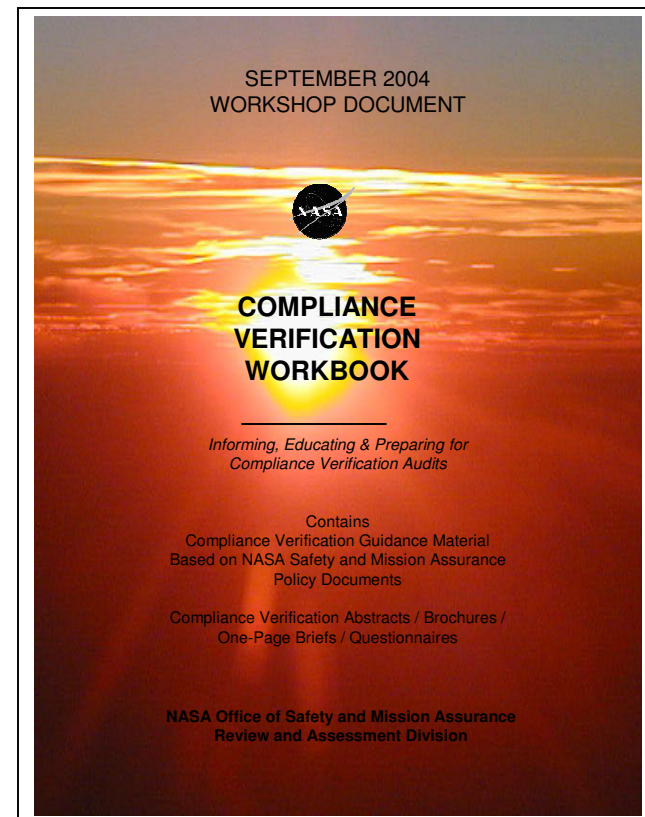
# **Logistics / Agenda**

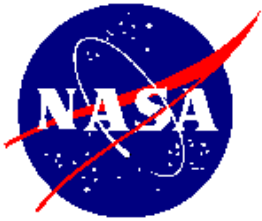


Safety....The NASA Family....Excellence....Integrity

## A Call for Focus

- Help us to stay on the subject of the Workshop
  - Try to resist the temptation to rewrite or debate the baseline requirements contained within documents within the context of workshop
    - Please feel free to propose (in writing) improvements to any NASA SMA document
    - OSMA document subject matter experts available for off-line discussions





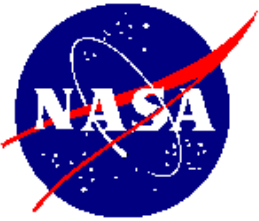
**Safety....The NASA Family....Excellence....Integrity**

## **Tuesday Agenda**

---

**Tuesday, September 14, 2004**

- 7:30 Register/Name Tags – at the Hotel Boulderado**
- 8:00 Welcome – Bryan O'Connor**
- 8:30 Introduction – Dr. Steve Newman**
- 9:30 Requirements Management/Development Status: Dr. Michael Stamatelatos**
- 10:15 Break**
- 10:30 Programmatic Audit Process – Steve Wander**
- 11:15 Institutional Audit Process – Art Lee**
- 12:00 Lunch - Mr. Al Ford Jr. PE, Deputy Director, Submarine Safety & Quality Assurance, Naval Sea Systems Command (NAVSEA 07Q)**
- 1:00 Break**
- 1:20 Work Session 1**
  - Group A: Programmatic – Audit Process Discussion**
  - Group B: Institutional – Audit Process Discussion**
- 4:00 Daily Review**
- 4:30 Adjourn**
- 6:00 Meet for Dinner**



**Safety....The NASA Family....Excellence....Integrity**

## **Wednesday Agenda**

---

**Wednesday, September 15, 2004**

**8:00 Reconvene**

**8:30 Work Session 2**

**Group A: Programmatic – Program Implementation**

**Group B: Institutional – Over-arching SMA Philosophy & Policy, Institutional / Operational Safety**

**12:00 Lunch – Mr. Tim Bassett of SUBMEPP**

**1:00 Work Session 3**

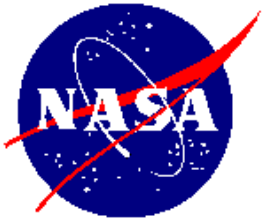
**Group A: Programmatic – Program Specific Requirements Documents**

**Group B: Institutional – Program Implementation, Contingency / Recovery / Investigation**

**4:00 Daily Review**

**4:30 Adjourn**

**5:00 Optional Tours of the Laboratory for Atmospheric and Space Physics (LASP), a research organization at the University of Colorado in Boulder. Funded primarily by NASA, members of LASP conduct fundamental research in the atmospheric and planetary sciences, develop space instrumentation, and create computer information systems for space operations.**



**Safety....The NASA Family....Excellence....Integrity**

## **Thursday Agenda**

---

**Thursday, September 16, 2004**

- 8:00 Out-brief of Work Session 1 Group A**
- 8:30 Out-brief of Work Session 1 Group B**
- 9:00 Out-brief of Work Session 2 Group A**
- 9:30 Break**
- 9:45 Out-brief of Work Session 2 Group B**
- 10:15 Out-brief of Work Session 3 Group A**
- 10:45 Out-brief of Work Session 3 Group B**
- 11:15 Final Comment**
- 12:00 Adjourn**